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EXPANDED PROGRAMME ON IMMUNIZATION

TRAINING COURSE ON PLANNING AND MANAGEMENT

GILL TREMLETT

Programme Design

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PROGRAMME DESIGN

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Use as much information as you have available to make this decision. Although you will inform mid-level managers of your decision, they may also recommend a delivery strategy which they consider appropriate. Since their decision may be based on more accurate and complete information, you may need to revise your decision at a later time.

FACTORS TO CONSIDER WHEN SELECTING AN IMMUNIZATION DELIVERY STRATEGY

a. It is important to integrate the immunization programme with existing health services as much as possible in order to reduce duplication of effort and use limited resources efficiently. Use health centres whenever possible and use the simplest mobile strategy when necessary. Outreach strategies, in which personnel give immunizations in a health centre some of the time and travel within a well-defined area from that centre to other villages the rest of the time, are often the most desirable. If used, staff should come from the nearest health centre, rather than from a distant city.

b. Population density will affect your choice of strategies, as will the numbers and distribution of nomads and migrants.

c. Distribution of health centres is another factor. If people have to travel great distances or if transportation is too difficult or costly, they will not get immunized. If people have to walk over 5 kilometres to be immunized, few of them will do so.

d. The costs of vehicles, maintenance, and petrol are becoming increasingly important. Even where mobile strategies are appropriate, consider using bicycles, public transport, motorcycles, or small cars whenever possible. (This is most feasible when using an outreach strategy.)

The immunization delivery strategy to be used in each area and the priority diseases determine the immunization schedule to be used (that is, <u>what</u> immunizations will be given <u>when</u>).

The recommended number of doses for each vaccine is summarized below:

Measles - 1 dose
DPT - 3 doses
Polio - 3 doses
BCG - 1 dose
Tetanus - 2 doses (for pregnant women)

Immunization schedules depend on whether the services will be provided by a fixed, a mobile, or an outreach strategy. More time is required by a mobile than a fixed strategy to administer a full round of immunizations. This is due to the large amount of time spent traveling to the population with a mobile strategy.

Following are sample immunization schedules for fixed, outreach, and mobile strategies:

Fixed Schedule (may also be appropriate for outreach strategies)

1. 3 months - 1st DPT, BCG, 1st Polio
2. 4-5 months - 2nd DPT, 2nd Polio
3. 5-7 months - 3rd DPT, 3rd Polio
4. 9 months - Measles

Outreach Schedule (may also be appropriate for mobile strategies)

1. 3-5 months - 1st DPT, BCG, 1st Polio
2. 6-8 months - 2nd DPT, 2nd Polio
3. 9-14 months - 3rd DPT, 3rd Polio, Measles

Mobile Schedule (team visiting area every 6 months)*

1. 3-8 months - 1st DPT, 1st Polio, BCG
2. 9-14 months - 2nd DPT, 2nd Polio, Measles
3. 15-21 months- 3rd DPT, 3rd Polio

These schedules are just samples and may be revised when appropriate.

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*NOTE: Each area must be visited at least once every 6 months.

PROGRAMME DESIGN

INTRODUCTION

Once the objective and first year targets for an immunization programme have been established, the immunization programme can be designed. A programme must be designed to increase the chances that the objective and targets will be achieved. The tasks involved in designing a programme are:

- Determine the immunization delivery strategy (fixed/mobile/outreach) and the immunization schedule,
- Design the cold chain system,
- Estimate the resources required to implement the programme, and revise the programme design if available resources are insufficient, and
- Identify a tentative starting date.

Once the first year of the immunization programme has been designed, it will then be necessary to consider how the programme could be expanded after the first year, including a consideration of expected changes in the cost of the programme over the 5-year planning period.

STATEMENT OF PURPOSE

In this module you will

- design the first year of the immunization programme in Fictitia,
- determine how Fictitia will expand its immunization programme over a 5-year period, and
- calculate expected changes in the cost of Fictitia's immunization programme over a 5-year period.

The information you receive and the skills that you practice in this module will assist you in designing the immunization programme for your country.

1.0 DESIGN THE IMMUNIZATION PROGRAMME FOR YEAR 1.

In order to design the first year of the immunization programme, you will need to complete the following steps:

- Determine the immunization delivery strategy and the immunization schedule.
- Design the cold chain system.
- Determine the resources required to implement the programme.
- Identify the starting date.

1.1 Determine the Immunization Delivery Strategy and Immunization Schedule

There are three basic delivery strategies from which to choose. The first type is a fixed strategy, in which immunizations are given at health centres and sometimes hospitals. Staff are permanently assigned to the facilities and give immunizations there as part of their routine duties. A fixed strategy is usually the least expensive type because it utilizes resources that currently exist and minimizes transportation costs.

The second type of immunization delivery strategy is the outreach strategy, which also uses health centres. As in a fixed programme, the staff are permanently assigned to the centre and immunize as part of their routine duties. An outreach strategy differs from a fixed strategy, however, in that the staff may travel to sub-centres or dispensaries in surrounding areas, or to villages where no health facilities are available. It is more expensive than a fixed programme due to the added cost of transportation and cold storage equipment. But it is the most common type because it is easily adaptable to various kinds of geographic areas and reaches the greatest number of people.

The third type of immunization delivery strategy, the mobile strategy, consists of a group of health workers which travels to areas where no health facilities are available. This group is not assigned to any health centre, but usually operates from the Regional Office. This type of strategy is the most expensive due to the cost of additional personnel, transportation, and equipment.

To determine the most appropriate delivery strategy for the areas to be included in the first year of a country's immunization programme, you will need to evaluate the areas in light of the factors listed on the next page.

Exercise A

In this exercise you will determine the immunization delivery strategy for the area to be included in the first year of the immunization programme in Fictitia, and an appropriate immunization schedule for the area.

- Read and follow the instructions carefully.
- Write your answers in the space provided beneath each question.
- When you need data refer to the description of Fictitia in the Introduction ("Demographic Data" and "Current Health Care Delivery Systems").
- If you have questions, consult with a Course Facilitator.

The geographic area to be included in the first year of Fictitia's immunization programme is the cities and towns in the Coastal Region with ≥ 15,000 population (that is, the large urban areas in the Coastal Region). The priority diseases are neonatal and non-neonatal tetanus, measles, pertussis, diphtheria, poliomyelitis, and tuberculosis.

Evaluate Fictitia's priority area in light of the factors listed on page 3 in this module, and then answer the following questions. Since there is no single right answer for this exercise, be prepared to explain your decisions.

1. Which immunization delivery strategy (fixed, outreach, mobile) would you select for the area? Why?

2. Which immunization schedule would you select for the area? Why?

When you have completed this exercise, discuss your answers with a Course Facilitator.

1.2 Design the Cold Chain System

The second major task involved in designing the first year of an immunization programme is to design a cold chain system for the country.

The cold chain is a system for distributing vaccine in a potent state from the manufacturer to the immunization site. An effective cold chain is made up of three parts:

- adequate supplies of effective vaccine;
- effective people to run the cold chain;
- effective equipment to keep the vaccine cold.

Guidance on how to design a cold chain system is provided below. More detailed information can be found in the articles listed in the cold chain bibliography*.

1.2.1 Ensure Adequate Supplies of Effective Vaccine

To ensure adequate supplies of effective vaccine, a national manager of an immunization programme must perform three tasks:

- Ensure that sufficient quantities of vaccine are available;
- Ensure that vaccine is supplied to each level of the cold chain at the correct interval; and
- Purchase good quality vaccine from overseas.

These three tasks are essential to the success of an immunization programme. If these tasks are done properly, many common problems in a cold chain can be avoided. Each of these tasks is described briefly below.

1.2.1.1 Ensure that Sufficient Quantities of Vaccine Are Available

There are 2 possible methods for calculating the average yearly volume of vaccine needed. These methods are briefly described on the next page.

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*NOTE: An annotated cold chain bibliography is available from WHO country offices, regional offices, or WHO, Geneva.

- TOP DOWN METHOD

  In this first method, known as the Top Down method, estimates of the average yearly volume of vaccine to be distributed to each level of the cold chain from the Central Store are made at the Central level. To begin a programme, a national manager would probably base this estimate on the first year coverage targets for the country, including safety stocks in case of epidemics or unexpected delays in arrival of vaccines.

  After the first year of a programme, a national manager might base this estimate on the year's coverage targets and/or on records of past usage received from health centres and/or regions or districts.

- BOTTOM UP METHOD

  In this second method, known as the Bottom Up method, estimates of average yearly volume of vaccine to be distributed from the Central Store are made by staff at the health centre and regional/district levels of the cold chain. Staff at each level (starting at the health centre level) are asked by the Central Store to estimate the amount of vaccine that will be needed at their level. These local and regional estimates of vaccine needs will usually be based on local coverage targets, and/or, if the programme has already started, on records of past usage.

1.2.1.2 Ensure That Vaccine Is Supplied to Each Level of the Cold Chain at the Correct Interval

Vaccine should be supplied to each level of the cold chain so that:

- all vaccines reach the immunization worker in less than 12 months (and thus do not expire before use)*;
- vaccine is stored for the shortest possible time at levels which have any danger of power failure or equipment breakdown;
- the number of trips needed to collect or deliver vaccine is kept to a minimum;
- the smallest practical quantity of vaccine is stored at each level to reduce the cost of the vaccines in the cold chain.

Once the frequency of supply is determined, the amount of reserve stock that should be stored at each level of the cold chain can be identified. The amount of vaccine to be kept in reserve should be as small as possible, yet should also be consistent with the frequency of collections or deliveries and the reliability of available transportation.

1.2.1.3 Purchase Good Quality Vaccine from Overseas

When buying vaccine from overseas, you will need to provide each selected manufacturer with the following information.

- Specify that the vaccine packaging should meet the WHO standards. This means that:
  - the package used for shipping the vaccine should have adequate cold life;
  - the boxes should be white in colour and labelled clearly on all sides;

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*NOTE: To determine the length of time that vaccine will travel through the cold chain before it is used by the immunization worker, add the number of months supply of vaccine in reserve plus the number of months supply in stock in each level of the cold chain.

  - the vaccine packages should contain time-temperature indicators to monitor the temperature of the vaccine during the trip;
  - telex advice of any vaccine shipments should be sent one week in advance of the shipment.
- Specify that the vaccines must conform to WHO standards.
- Specify the quantity of vaccine required, the number of doses per ampoule and the quantity of diluent.
- Specify the shipment schedule (for example, one sixth of the total order is expected to be shipped every two months).

Further information on purchasing vaccine can be found in "WHO Guidelines on the International Shipment and Packaging of Vaccine." These guidelines are listed in the Bibliography.

Exercise B

In this exercise you will consider advantages and disadvantages of 2 methods for calculating average yearly volume of vaccine to be distributed from the Central Store.

- Read and follow the instructions carefully.
- Write your answers in the spaces provided.
- If you have questions, consult with a Course Facilitator.

Two possible methods for calculating average yearly volume of vaccine to be distributed from the Central Store were described on page 7 in this module. Review the description of each method at this time. Then list at least 2 advantages and 2 disadvantages of each method.

TOP DOWN METHOD

Advantages

1.

2.

Disadvantages

1.

2.

BOTTOM UP METHOD

Advantages

1.

2.

Disadvantages

1.

2.

Exercise C

In this exercise you will select the vaccine delivery schedule for Fictitia.

- Read and follow the instructions carefully.
- Write your answers in the space provided.
- If you have questions, consult with a Course Facilitator.

Review the following two vaccine delivery schedules. Which of these schedules would be better for Fictitia? Why?

	Vaccine Delivery Schedule #1	Vaccine Delivery Schedule #2
CENTRAL STORE	Delivery from overseas every 2 months	Delivery from overseas every 4 months
	2 month stock 1 month reserve	4 month stock 1 month reserve
DISTRICT STORE	Delivery every month	Delivery every 4 months
	1 month stock 1 month reserve	4 month stock 1 month reserve
HEALTH CENTRE	Delivery every month	Delivery every month
	1 month stock 2 week reserve	1 month stock 2 week reserve

When you have completed Exercise C, discuss your work on Exercises B and C with a Course Facilitator.

1.2.2 Ensure That There Are Effective People to Run the Cold Chain

The second major task in designing an effective cold chain is to ensure that there are effective people available to run the cold chain. To perform this task, a national manager must:

- Obtain needed staff and decide what cold chain training they need;
- Give continuing support to people who work in the cold chain.

Each of these tasks is described briefly below.

1.2.2.1 Obtain Needed Staff and Decide What Cold Chain Training They Need

As new staff are hired, they should be fully briefed in cold chain operations.

Guidance on obtaining staff and training them can be found in the mid-level module titled Provide Training. Refer to this module and the last pages of the WHO-UNICEF document SUPDIR 55 for help in training staff to properly operate a cold chain.

1.2.2.2 Give Continuing Support to People Who Work in the Cold Chain

Managers of district vaccine stores and health centres should be provided with the support they need to develop detailed plans for their own cold chains. This support should include information on:

- the frequency of vaccine supply to each level;
- the reserve stock that should be kept at each level;
- the standard types of equipment that will be used in the cold chain;
- whether vaccine will be delivered or should be collected.

Support should also include assistance in preparing the cold chain plan for a district store or health centre and in training appropriate staff in how to handle vaccines.

If people are well trained in cold chain operations and are well supervised, many of the familiar cold chain problems will be prevented. Additional information on supervision can be found in the mid-level module titled Supervise Performance.

1.2.3 Ensure Effective Equipment to Keep the Vaccine Cold

A cold chain cannot be effective without equipment that works well. In order to have adequate cold chain equipment, a programme manager must perform three activities:

- Determine if the amount of cold storage space available in the central store is adequate for incoming vaccine.
- Select standard types of equipment for the country.
- Plan to maintain the vaccine and equipment.

These activities are described below.

1.2.3.1 Determine if the Amount of Cold Storage Space Available in the Central Store is Adequate for Incoming Vaccine.

In order to be able to store vaccine properly, the central store must have cold storage space which is:

- large enough to store the vaccine, and
- able to make and store enough ice to distribute the vaccine safely in cold boxes.

The cold storage space needed in a central vaccine store depends on:

- the size of the population to be supplied. Since the population will increase each year, the size of the cold storage space needed at the central level store should be based on the estimated population for the next 10 years;
- the quantities of vaccine to be delivered and the quantities of reserve stock;
- the quantities of vaccine to be stored at 4°C to 8°C (BCG, DPT, tetanus toxoid, and DT) and the quantities to be stored at -20°C (polio and measles).

Vaccine can be stored at the central store in cold rooms, refrigerators, and/or freezers.

The following table shows an estimate of the amount of storage space needed at each level of the cold chain for one month's stock of vaccine.

STORAGE SPACE NEEDED FOR ONE MONTH'S STOCK OF VACCINE

IF SIZE OF POPULATION TO BE SUPPLIED IS:	THEN COLD BOX SPACE NEEDED IS (in litres):	REFRIGERATOR SPACE (+8°C) NEEDED IS (in litres):	COLD ROOM SPACE (+8°C) NEEDED IS (in litres):	FREEZER SPACE (-20 C) NEEDED IS (in litres):
100,000	3	12	0	0
1,000,000	30	80	0	40
10,000,000	300	0	2,000	400

The estimated space requirements shown on this table assume the use of top-opening refrigerators. If front-opening refrigerators are used, storage space needed for one month's stock of vaccine would be twice the amounts shown.

Factors such as birth rate, vaccine wastage, immunization schedule, and vaccine volume were taken into account in estimating the space requirements shown on the table above. They are based on the WHO document CC/IS/80.10.

1.2.3.2 Select the Standard Types of Equipment

Using standard types of equipment throughout the cold chain reduces problems in:

- ordering the equipment;
- delivering the equipment;
- maintaining the equipment;
- training staff to use the equipment.

There are three steps to perform when making an equipment list for a country. These steps are described on the next page.

Identify the equipment already available in the country.

Make an inventory of equipment that is already in place. This inventory should cover the geographic areas that the programme will reach in the next 3 years since it is usually impractical to conduct an inventory more often than every 3 years.

The inventory form should include questions on:
- what equipment is already in place;
- what condition the equipment is in;
- what fuel supplies are available locally.

The inventory form used in a country could include questions not only about cold chain equipment but also about equipment needed for other programmes involved in the delivery parts of primary health care.

The replies to this inventory will allow a national programme manager to decide:
- what types of equipment are most reliable in the country;
- what types of equipment are adequate and most commonly used (that is, what types of equipment should be ordered in the future);
- how much repair and maintenance work is needed on equipment already in place;
- whether or not to limit expansion of the immunization programme to areas where there are relatively few cold chain problems.

Determine what equipment can be purchased locally.

It is always better to buy locally made equipment rather than imported equipment, as long as the local equipment operates as well. This is because replacements, spare parts, and repair technicians are easier to find for local equipment than for imported equipment.

The only way to find out if locally made equipment operates well is to test it. Detailed protocols for laboratory tests are available from WHO, but simple tests can and should be done on all new types of equipment purchased locally. Check first to see if WHO has already tested this equipment. If not, simple tests can be done in a few days to discover the following critical performance indicators.

For refrigerators, simple tests can be done to indicate the internal temperature and amount of ice that can be made with the refrigerator running under the hottest conditions where the equipment will be used.

For cold boxes, tests can determine the cold life that can be maintained in the hottest conditions where the equipment will be used (and the weight, strength, and cost of the cold boxes should also be compared).

Decide what equipment has to be imported.

SUPDIR 55, a document jointly published by WHO and UNICEF, lists all the cold chain equipment that has been tested and found to be effective for use in tropical conditions.

A standard list of equipment should be selected so that:

- the size, cold life, weight, delivery time, and costs of cold boxes are all appropriate for the planned use in the central store, district stores, and health centres,
- the size, type of fuel used, delivery time, performance, and cost of refrigerators and freezers are appropriate for the planned use in the central store, district stores, and health centres.

Exercise D

In this exercise you will modify a survey form for refrigerators and electricity supply so that only information which is relevant for your country is included on the form.

- Read and follow the instructions carefully.
- Write your answers directly on the survey form provided.
- If you have questions, consult with a Course Facilitator.

On pages 19 - 21 is a survey form for refrigerators and electricity supply which was drafted for use in Fictitia for selecting the best type of equipment in which to store vaccine in the country. There may be many ways that you could improve this form for use in your country. Read the form and consider whether or not it includes the most important information for your country. Write in any additional questions and/or possible answers that you think are very important, modify any that you think should be changed, and draw a line through any that you feel are not very important. Since there is no single right answer for this exercise, be prepared to explain your decisions.

When you have completed this exercise, discuss your answers with a Course Facilitator.

Survey Form of Refrigerators and Electricity Supply

The purpose of this survey is to help the planners of the Expanded Programme on Immunization (EPI) choose the best type of equipment for storing vaccine. We want to find out:

- if you have a suitable refrigerator for storing vaccines;
- if it is not working, what is wrong with it;
- how good the fuel supplies are in your area.

Please return this form to (name) _____ at (address) _____ by (date) _____.

1. A refrigerator which is suitable for storing vaccine is one which is:

   (a) able to keep below 8°C at the hottest time of the year;
   (b) able to keep above -3°C minimum during cold nights;
   (c) large enough to store maximum requirements; and
   (d) able to make enough ice to sustain outreach activities.

   Do you have a refrigerator(s) that is suitable for storing vaccines? YES NO

   - If NO, go to question 6.
   - If YES, go to question 2.

2. What type of refrigerator(s) do you have? Complete the table below.

Manufacturer	Model	Kerosene (K), Gas(G), or Electric(E)	Capacity	Refrigerator compartment working at a temperature below 8°C and above -3°C?	Freezer compartment working at a temperature lower than -5°C?

3. If your refrigerator/freezer is not working properly or at all, state the reason(s) below:

4. Are any parts of the refrigerator/freezer missing or damaged? If yes, complete the table below.

Model	Ice tray	Shelves	Thermometer	Door Seal	Other (Specify)

5. FOR KEROSENE REFRIGERATORS:

List the spare parts you have in stock (that is, lamp glass, wick, flue brush, flue baffle, lock and key, complete burner, kerosene can). If none, write none.

FOR ELECTRIC REFRIGERATORS:

List the spare parts you have in stock (for example, thermostat, door seal, starting capacitor, running capacitor). If none, write none.

FOR GAS REFRIGERATORS:

List the spare parts you have in stock (for example, gas jet, thermostat or regulator, baffle, spark generator). If none, write none.

6. How good is the electricity supply in your area: Circle one:

Regularly 24 hours per day

Regularly less than 20 hours per day

Regularly less than 8 hours per day

7. Are other fuels regularly available?

Kerosene	YES	NO
L. P. Gas	YES	NO

8. Indicate below which other cold chain equipment you have that is in working condition, and the quantity of each.

Cold box	Number_____Capacity_____
Vaccine carrier	Number_____Capacity_____
Ice packs	Number_____
Refrigerator thermometer	Number_____
Voltage stabilizer	Number_____

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1.2.3.3 Plan to Maintain the Vaccine and Equipment

At each level of the cold chain three things must be monitored regularly:

- vaccine stocks,
- vaccine storage, and
- equipment care.

Vaccine stocks

Vaccine stocks should be checked on a routine basis to see if:

- there is the correct quantity of vaccine in the store--not too much and not too little;
- there is an adequate reserve stock; and
- the vaccines are within their expiry date.

The amount of vaccine used over a long period of time (for example, six months) in a store should be compared to the remaining vaccine in that store. Under normal conditions the reserve stock should be between one quarter and one half of the total vaccine used.

The number of doses of vaccine used over a long period of time should also be compared to the number of children who received immunizations. If the number of doses used is greater than the number of children immunized, it may be that vaccine is being wasted. Information on vaccine wastage can be useful when calculating the amount of vaccine to re-order.

Vaccine storage

The quality of vaccine storage should be checked regularly at each level of the cold chain. Items that should be checked in a typical central or regional store are as follows:

Is the temperature between $4^{o}C$ to $8^{o}C$?
Is the store kept locked?
Is the evaporator free of ice?

Are the vaccines well organized?

Do the vaccines have an expiry date that will not pass before the vaccines are used?

Are cold boxes packed in a cool area?

Is the DPT or tetanus toxoid vaccine safe from risk of freezing?

If the answer to all of these questions is "yes," staff are storing vaccine effectively. Compliment them for their good work. If the answer to any question is "no," try to find out the cause of the problem. Then take appropriate action to resolve the problem.

Equipment care

The size of this task should not be underestimated--it is normal for 30% to 50% of all refrigerators in the field to be out of order when an expanded programme on immunization is begun. Questions that should be asked when monitoring equipment care in a central or regional store are the following:

Have the refrigerator and freezer been running continuously since the last supervisory visit?

Is the door or lid of the refrigerator/freezer airtight?

Are there adequate stocks of spare parts?

Is there a reserve supply of fuel?

Is the temperature alarm working?

Are there enough syringes and needles?

Are the emergency procedures for a breakdown known?

Is there one person responsible for equipment care?

In addition, the central store must be safe from power failures and able to keep a proper temperature. This is very important because if there is any malfunction in a central store, 3-6 month stock of vaccine for the whole country can be damaged.

To determine if the central store is safe, check three things:

- Is the store connected to a reliable 24-hour electricit supply (for example, a hospital) or is there an

"autostart" emergency generator on hand? If the generator is the manual start type, is there a skilled operator to start it?

- Is there a chart recording thermometer monitoring the temperature day and night?
- Is there an alarm system to warn of a rise in temperature above 8°C?

A plan should be prepared for estimating the size of the maintenance problem and for identifying the repairs that must be made. The plan should also include procedures for deciding what additional training in maintenance is required. Two types of training will be needed: training for the users of the refrigerators and training for repair technicians. All but the most serious faults on refrigerators can be repaired by the user. If appropriate staff are trained in simple care of equipment, most of the common maintenance problems will not occur.

Training materials for the users of cold rooms and of kerosene, gas, and electric refrigerators are available from WHO. Using these materials, national courses for repair technicians can be organized.

Repairs cannot be made without tools and spare parts. Decide what spare parts are needed to maintain the cold chain. Make sure that spare parts common to many different types of refrigerators are available. Identify the quantities and types of spare parts needed, and decide at what level in the cold chain these parts should be stored.

More detailed information on maintaining equipment can be found in the mid-level module titled Manage the Cold Chain System and in the references listed in the Bibliography.

1.3 Determine the Resources Required to Implement the Programme

The third major task involved in designing an immunization programme is to determine the resources required to implement the programme.

To implement the immunization programme, both personnel resources and material resources are required. To estimate how much of these resources are needed, it will be necessary to perform the following steps:

a. Identify types of personnel and material needed at the central level, the regional level, and each health centre.

   Fold out Worksheet A titled "Resource Estimates" which is located on page 29 in this module. This worksheet lists possible types of personnel and material which may be needed to carry out immunization activities.

b. Identify the number of each type of personnel and the amount of each type of material currently available.

   To obtain accurate information about what is available throughout a geographic area, it may be desirable to consult the mid-level managers in the area, as well as to make your own identification of central level personnel and material. You may wish to provide each manager with a copy of the "Resource Estimates" worksheet for his or her use in recording and reporting the availability of personnel and material.

c. Determine the population that can be reached with the personnel and material available.

   This procedure is outlined in the mid-level module titled Allocate Resources. You may wish to have each mid-level manager make this determination and provide you with the information (along with his or her calculations so you can ensure that the estimates were arrived at correctly). Then you will need to total the entire population which can be reached with available personnel and material.

d. Determine if there are sufficient personnel and material resources available to achieve the targets.

   - If yes, you may wish to consider raising your targets.
   - If no, you will need to determine what additional personnel and material are needed to achieve the targets.

It is important to be as accurate and as precise as you can in making estimates of needed resources. If it is clear exactly how these resources will be used, you may have more success when you try to convince donors or budget officials that they will be used effectively.

e. Estimate the operating costs which would be required to immunize the entire target population (even if you do not yet have all the personnel and material you would need to immunize that population).

Types of operating costs include the following:

Salaries

Vaccines, needles, syringes, cotton wool

Transportation (including staff travel, vehicle maintenance, petrol, and vaccine shipment costs)

Cold chain maintenance, fuel

Running costs of health centre (such as power, maintenance)

Publicity

Training

Immunization cards

f. Determine if there are sufficient funds available for all the operating costs.

- If yes, you are very fortunate.
- If no, estimate how much additional money you need for operating costs.

g. Seek needed additional resources from the national budget or from donors to meet the programme's requirements for additional personnel, material, or operating costs.

h. If it is impossible to get additional resources, modify the programme targets and/or programme design in one or more of the following ways:

(1) Select smaller geographic area(s).
(2) Consider whether one or more diseases can be omitted from the immunization schedule.
(3) Reduce the frequency at which immunizations are given.

If you decide to modify your targets, ensure that they can be achieved with available personnel, material, and funds.

Exercise E

In this exercise you will identify the types of personnel and material which you feel are needed to carry out immunization activities in your country.

- Read and follow the instructions carefully.
- Write your answers directly on the worksheet provided.
- If you have questions, consult with a Course Facilitator.

Examine the types of personnel and material listed in the left column on Worksheet A on the next page. Consider whether or not the list includes the types of personnel and material needed to carry out the immunization programme in your country. Draw a line through any types of personnel and/or material which you feel are not necessary, modify any that you feel should be changed, and write in any additional types which you feel are important and should be added to the list. Since there is no single right answer for this exercise, be prepared to explain your decision.

When you have completed this exercise, discuss your answers with a Course Facilitator.

1.4 Identify the Starting Date

It can be tentatively assumed that the programme may begin operations approximately six months after funds become available. Additional factors to consider in identifying a starting date are:

- the amount of time needed to get additional equipment,
- the amount of time needed to get sufficient vaccine from the manufacturer,
- the amount of time needed to get vaccine and supplies distributed to the regional stores, district stores, and health facilities, and
- the amount of time needed to obtain and train essential personnel.

Before continuing on the next page with Step 2.0, "Establish Coverage Targets and Design the Immunization Programme for Years 2-5," you may wish to review the four major steps involved in designing the first year of a programme (Steps 1.1-1.4). In particular you should consider, among other things:

- the advantages and disadvantages of short versus long supply periods of vaccines,
- the types of personnel, material, and operating costs which you think a successful programme must have, and
- the advantages and disadvantages of various ways of reducing programme costs.

When you have reached this point, tell a Course Facilitator that you are ready for a group discussion.

2.0 ESTABLISH COVERAGE TARGETS AND DESIGN THE IMMUNIZATION PROGRAMME FOR YEARS 2-5.

Planning for a nationwide programme will be a two-step process. Tentative plans for a 5- to 10-year programme should be made well in advance based on priorities established in terms of disease, funds available, and programme costs. These plans should then be revised based on an evaluation of the first year of the programme and should be annually revised based on new information. Expansion into a nationwide programme may occur gradually. The rate at which you expand will depend on available funds and available information on programme effectiveness. Your final plans for a nationwide programme should consider the following factors:

a. the successes of the first year of the programme;
b. the failures of the first year of the programme;
c. the extent of the disease in any area into which you expand;
d. the amount of money available;
e. the feasibility of the expansion;
f. an equitable balance between urban and rural populations; and
g. the political climate in the country.

Many of the steps in planning the expansion are the same as the steps in planning the first year of the programme. They are:

- Determine coverage targets for years 2-5.
- Determine the immunization delivery strategy and the immunization schedul
- Modify/expand the cold chain system, if necessary.
- Determine the resources required to implement the expansion.

2.1 Determine Coverage Targets for Years 2-5

In order to determine coverage targets for years 2-5 of the immunizatio programme, you will need to complete 2 steps:

- Select expansion areas and priority diseases.
- Determine the target populations.

2.1.1 Select Expansion Areas and Priority Diseases

Expansion of the first year of the immunization programme into a nationwide programme may occur in a variety of ways.

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You may decide to:

a) reach more people with the same antigens;

b) reach the same number of people with more antigens; and/or

c) reach more people with more antigens.

IF YOU CHOOSE TO:	THEN, DO THIS:
Reach more people,	• Either expand into new regions and/or provide greater coverage in regions already included (for example, include more urban areas, expand to include rural areas).
Expand the programme into other geographic areas,	• Determine in which region each additional area is located. • For each of these regions, select the diseases which were assessed as having high or moderate overall priority when you determined regional priorities for immunization.
Increase the number of antigens to be administered,	• For the regions in which each priority area is located, select additional diseases which were assessed as having high and moderate priority. (If all diseases of high and moderate priority in a region are already included in the programme, it may be more appropriate to select additional populations and/or areas to cover.) • Consider additional cost (personnel, equipment, and storage facilities) required to deliver the vaccine and to maintain its potency.

2.2 Determine the Immunization Delivery Strategy and the Immunization Schedule

2.3 Modify/Expand the Cold Chain, If Necessary

For these two steps in the planning process, the guidelines provided in Steps 1.1 and 1.2 on pages 2 - 24 in this module may be followed.

2.4 Determine Resources Required to Implement the Expansion

The information on resource estimates presented earlier in Step 1.3 (see page 25 in this module) may be helpful here. Another factor to consider in planning the resources to expand a programme, in addition to the factors discussed in Step 1.3, is that programme costs may change over time. Changes expected in the relative cost of an immunization programme over time can be estimated using the following 3 measures:

- Cost to prevent one case of disease.
- Cost to prevent one death from disease.
- Cost to fully immunize one child.

The following procedures can be used to compute the above measures.

Annual Cost to Prevent One Case of Disease:

• Total annual cost of programme	÷	Total number of cases expected to be prevented that year	=	Total annual cost to prevent one case of disease

Annual Cost to Prevent One Death from Disease:

• Total annual cost of programme	÷	Total number of deaths expected to be prevented that year	=	Annual cost to prevent one death from disease

Annual Cost to Fully Immunize One Child:

• Total number of people expected to become immune to each disease (except neonatal tetanus)	÷ 6		=	Total number of children expected to be fully immunized
• Total annual cost of programme	÷	Total number of children expected to be fully immunized	=	Annual cost to fully immunize one child

Exercise G

In this exercise you will estimate the changes in cost over time for Fictitia's immunization programme.

- Read and follow the instructions carefully.
- Write your answers in the spaces provided.
- If you have any questions, consult with a Course Facilitator.

Fold out Worksheet B on the next page. Take a few minutes to review the column headings. Then use the following guidelines to complete this worksheet for Fictitia.

1. Calculate the annual cost to prevent one case of disease in Fictitia in 1982 by dividing the total annual cost of the programme in 1982 (already recorded on the worksheet in Column 2) by the total number of cases expected to be prevented that year (already recorded in Column 3). Record your answer in Column 4. (The annual cost to prevent one case of disease in 1984 and 1986 has already been calculated for you and recorded on the worksheet.)

2. Calculate the annual cost to prevent one death from disease in Fictitia in 1982 by dividing the total annual cost of the programme in 1982 (already recorded on the worksheet in Column 2) by the total number of deaths expected to be prevented that year (already recorded in Column 5). Record your answer in Column 6. (The annual cost to prevent one death from disease in Fictitia in 1984 and 1986 has already been calculated for you and recorded on the worksheet.)

3. Calculate the annual cost to fully immunize one child in Fictitia in 1982 (already recorded on the worksheet in Column 2) by the total number of children expected to be fully immunized that year (already recorded in Column 7). Record your answer in Column 8. (The annual cost to fully immunize one child in Fictitia in 1984 and 1986 has already been calculated for you and recorded on the worksheet.)

Did the programme costs change over time?

When you have completed this exercise, tell your Course Facilitator that you are ready for a group discussion on the exercise.

Exercise F

In this exercise you will determine the means of expansion appropriate for Fictitia's immunization programme over the 5-year period.

- Read and follow the instructions carefully.
- Write your answer in the space provided.
- When you need data, refer to Worksheet C on page 17 in the module titled Regional Priorities.
- If you have questions, consult with a Course Facilitator.

In the space below briefly describe how you would expand Fictitia's immunization programme over the 5-year period. Note that there are many possible ways in which the programme could be expanded, and therefore there is no single right answer. Be prepared to discuss and justify your expansion plans.

When you have completed this exercise, tell a Course Facilitator that you are ready for a group discussion on the exercise.

2.1.2 Determine the Target Population

In order to compute the target population for the expansion, you would need to know the number of infants surviving to one year of age in the second year of the country's immunization programme. Since this number will increase each year in accordance with the annual growth rate of the entire population (see the footnote on page 6 of the module titled Programme Targets), you would use the following formula to estimate the number of infants surviving to one year of age (that is, the target population of infants) in the second year of the programme.

- Number of infants surviving to 1 year of age in each area in the first year of the programme **X** Estimated population growth factor for the second year of the programme **=** Number of infants surviving to 1 year of age in each area in the second year of the programme

For the third through the fifth years of a country's programme, you would repeat the above calculations, multiplying the number of infants surviving to one year of age in each area in the second, third, and fourth years of the programme times the estimated population growth factors for the third, fourth, and fifth years of the programme, respectively.

To determine the target population of women for each year of the expansion in countries which use the strategy of immunizing all pregnant women and mothers who bring their children for immunization, you would use the following formula:*

- Target population of infants **X** 2 **=** Target population of women

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*NOTE: If at this point in planning your programme's design better information is available for you to use in making this estimate, use the improved data. If more precise data are not yet available, continue to use the procedure outlined above.

1 Year of Programme	2 Total Annual Cost	To Nu of Ex to Pr
1982	$ 750,000	
1984	$1,800,000	
1986	$2,800,000	1,

*NOTE: In U.S. dollars.

CONCLUSION

This module has described procedures for designing the first year of an immunization programme, and for planning expansion of the programme over a 5- to 10-year period.

The major tasks involved in designing the first year of an immunization programme are:

- Determine the immunization delivery strategy and the immunization schedule,
- Design the cold chain system,
- Estimate the resources required to implement the programme, and
- Identify a starting date.

The major tasks involved in planning the expansion are:

- Determine coverage targets for years 2-5 of the programme,
- Determine the immunization delivery schedule and the immunization schedule,
- Modify/expand the cold chain system, if necessary, and
- Determine the resources required to implement the expansion.

All of a programme's first year design should be based on the first year targets to be achieved. The tentative plans for the 5- to 10-year programme expansion should then be revised based on an evaluation of the first year of the programme. These plans should also be revised annually as new information is obtained.

WORKSHEET B

CHANGES IN COST OVER TIME*

3 r ses ted nted	4 Cost Per Case Prevented (Col.2 ÷ Col. 3)	5 Total Number of Deaths Expected to be Prevented	6 Cost Per Death Prevented (Col.2 ÷ Col.5)	7 Total Number of Children Expected to be Fully Immunized	8 Cost Per Fully Immunized Child (Col.2 ÷ Col.7)
		12,783		148,327	
,000	2.72	51,600	34.88	365,365	4.93
,000	2.66	81,200	34.48	575,160	4.87